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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/076,349	02/19/2002	Kenji Maruyama	107317-00043	1365

4372 7590 05/08/2003

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EXAMINER
WOJCIECHOWICZ, EDWARD JOSEPH

ART UNIT	PAPER NUMBER
2815	6

DATE MAILED: 05/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/076,349	MARUYAMA ET AL	
	Examiner	Art Unit	
	Edward Wojciechowicz	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) *11-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of claims 1-10 in Paper No. 5 is acknowledged.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Klee et al, and further in view of Noguchi et al and the Japanese patent document to Kazuhiro. Applicant's inventive structure describes a multilayer device having an MgO layer, an ReO_3 layer formed thereon, and an oxide ferroelectric layer formed on the ReO_3 layer, where each of the layers has a (001) crystal orientation. This basic configuration is taught by Klee. See, for example, the discussion at col. 2, lines 25-34, where Klee describes the formation of a laminar structure where a ferroelectric film (later described as having a perovskite structure) may be contacted by rhenium oxide (ReO_3) electrodes. In col. 3, lines 51-55, Klee also discusses the use of a MgO support layer, as claimed.

While Klee shows the basic claimed structure of applicants' claim 1, Klee is silent as to the crystal orientation of these layers. However, Noguchi, which shows a related structure, teaches that these laminated layers perform best when all are orientated in the same direction. In addition, Klee teaches that a (001) orientation could typically be employed in such a device. See,

for example, Noguchi's discussion at col. 1, lines 51-54, at col. 2, lines 27-30, and at col.6, lines 54-55 for examples of the teaching of the (001) orientation as a preferred orientation.

These same recitations in Noguchi also serve to provide the motivation to combine this orientation feature with the basic structure of Klee, by teaching that this orientation provides for superior performance, as well. See, again Noguchi's statement at col. 1, lines 51-54, where Noguchi states, "In order that the perovskite oxide thin film ... can function well as a ferroelectric thin film, it should preferably be oriented in the (001) or (111) direction."

Similarly, the features of the dependent claims are all taught by the combination of Klee, Noguchi, and Kazuhiro. For example, claim 3 refers to the MgO layer formed on an amorphous layer, and Klee also allows for the use of an amorphous substrate, such as an amorphous glass or oxide. Since the overall device will typically be integrated on a silicon substrate with amorphous silicon oxide insulation, any subsequent formation of a MgO base layer would likely be on such an amorphous under layer.

Likewise, with regard to claim 4, both Klee and Kazuhiro discuss the formation of an upper electrode, as well. Kazuhiro also shows a conductive plug electrically connected to a semiconductor element through an insulating layer, as claimed in claim 5, and Kazuhiro also shows an ReO_3 electrode formed on the insulating layer and over the conductive plug, a recited in claim 6.

While Kazuhiro shows a simplified drawing illustrating only the basic structural elements of the invention, obviously, such a device structure would also need to have additional interlayer

insulating layers and local wiring to the upper electrode and the plug, in order to complete the device, and form a working device, as described in claim 7.

With respect to claims 9 and 10, Klee specifically teaches the use o many different electrode materials, along with the use of different materials for the upper and lower electrodes. Indeed, Klee even lists the same materials claimed in claim 10. See the discussion at col. 2, lines 45-65 where alternate electrode compounds such as IrO_2 and $SrRuO_3$ are listed.

Finally, the motivation to combine the Kazuhiro reference with Klee and Noguchi is found in the advantage of integrating the capacitor structure directly over the underlying semiconductor element to maximize space and facilitate device integration.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edward Wojciechowicz whose telephone number is 703-308-4898. The examiner can normally be reached on Mon-Thurs.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690.

Edward Wojciechowicz
Primary Examiner
Art Unit 2815

EW:ew

May 4, 2003